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(54) Title of the Invention: Method of Producing Intermediate Layer Lined on Both Sides

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CLAIMS

1. A method of producing an intermediate layer lined on both sides thereof, characterized in that an intermediate layer (2) is placed on a layer (1C) of a foamable material, the layer (1C) having a first cover layer (1) applied thereon, and that a second cover layer (3) provided with a layer (1C) of a foamable material on the lower side of the layer (3) is placed on the intermediate layer (2).

2. A method according to Claim 1, characterized in that the starting-time of the foamable materials (1C) is so selected that the reaction thereof is applied after the materials (1C) reach a pressing unit (5).

3. A method according to Claim 2, characterized in that the pressing unit is used to adjust the thickness of the final product.

4. A method according to Claim 2 or 3, characterized in that the pressing unit is formed of a calibration belt (5) running on the upper side.

5. A method according to Claim 1, characterized in that the starting-time and characteristics of the foamable materials

are so selected that the parts thereof can be incorporated based on the characteristics thereof without special calibration-process and without additional pressing-force.

6. A method according to any one of Claims 1 to 5, characterized in that intermediate layers of paper, plastics, asbestos, or similar materials are used.

7. A method according to any one of Claims 1 to 6, characterized in that intermediate layers (2) having a wave-form are used.

8. A method according to any one of Claims 1 to 6, characterized in that intermediate layers (2) having a polygonal or round form are used.

9. An apparatus for producing a both-side lined intermediate layer, characterized in that the apparatus comprises a device (1A) for laminating a foamable material (1C) on a first cover layer (1), a device (2A) for placing the intermediate layer (2) on the laminated cover layer (1), a second device (3A) for laminating a foamable material (1C) on a second cover layer (3), and a second device (4) for placing the laminated second cover layer (3) on the intermediate layer (2).

10. An apparatus according to Claim 9, characterized in that the apparatus includes a pressing unit (5) which acts on the layers placed together on the upper side thereof.

11. An apparatus according to Claim 10, characterized in that the pressing unit is formed of a calibration belt (5) running on the upper side of the layers placed together.

12. An apparatus according to any one of Claims 9 to 11, characterized in that the apparatus includes mixing heads (1A, 3A) for coating the layers of foamable materials (1C) on the cover layers (1, 3).

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VK 41

Patent- and Registered Industrial Design Subsidiary

Application

VKI-RHEINHOLD & MAHALA AG

METHOD FOR PRODUCING BOTH-SIDE LINED INTERMEDIATE LAYER

DESCRIPTION

The present invention relates to a method and an apparatus for producing a both-side lined intermediate layer.

Such lined intermediate layers are used for insulation, sound-damping, and anti-roaring of cover layers, e.g., door plates, furniture components, and so forth.

For many different use-objects, intermediate layers are foamed. Moreover, such foamed or not foamed intermediate layers are made to adhere to cover layers, so that sandwich-elements are produced. The sandwich-elements are stable, rigid against distortion and light.

However, the foaming of such intermediate layers and the adhesion of the foamed intermediate layers for incorporation to the cover layers are carried out by very unscientific methods, since many processes are required for applying the foam materials on the intermediate layers, coating adhesives onto the hardened foam materials and onto the cover layers, and bonding the intermediate layers to the cover layers. These processes may be carried out at intervals of time, since, generally, the adhesives can be coated after the foam materials are hardened.

Accordingly, an object of the present invention is to create a method and an apparatus of the stated category, by which above-mentioned disadvantages do not appear.

Especially, a method and an apparatus shall be proposed in which the lining and the foaming on the intermediate layer can be carried out in one process.

According to the present invention, the problem can be solved by a method in which an intermediate layer is placed on a layer of a foamable material, the layer being having a first cover layer applied thereon, and that a second cover layer provided with a layer of a foamable material on the lower side is placed on the intermediate layer.

The problem is solved by an apparatus of the stated category which comprises a device for laminating a foamable material on a first cover layer, a device for placing an intermediate layer on the laminated cover layer, a second device for laminating a foamable material on a second cover layer, and a second device for placing the laminated second cover layer on the intermediate layer.

The advantages obtained according to the present invention are based especially on the fact that the foaming on the intermediate layer and the lining, that is, the coating with the cover layer can be carried out practically at the same time in one process, so that the essentially enhanced effectiveness with respect to time is obtained compared to the conventional methods. Moreover, the foamable material serves not only for foaming on the intermediate layer but also for the lining and also bonding

between the intermediate layer and the cover layer. Thus, no additional adhesive is necessary.

By selection of most suitable materials for the intermediate layer, the foamable material, and the cover layers, a sandwich-coverings having a large surface and bonded to each other can be produced, and are suitable for many different purposes, e.g., for insulation, sound-suppression, sound-damping, and so forth. By corresponding modification, sandwich-coverings with complete fire-protecting characteristics can be attained.

As the foam material, for example, polyurethane-, polyester-, polyisocyanurate-(PIR), water glass- or phenol-foam materials are used.

For example, the intermediate layers can be made of paper, plastics, asbestos, or similar materials. To improve the tackiness of the foam material layers, the intermediate layers shall have such a form that the foam material layers can be easily foamed. For example, a corrugated board form or a polygonal form shall be mentioned.

For example, the cover layers may be made of steel sheets having a suitable thickness or other combustible, or incombustible materials.

The starting-time and the characteristics of foamable materials can be so selected that a special calibration-process is not necessary, but the respective layers can be

joined together based on their characteristics without additional pressing force being used.

Alternatively the starting-time and the characteristics of the foamable materials can be so selected that the reaction is set so as to cause the foaming on the intermediate layers and the simultaneous lining on the intermediate layers with the cover layers after the foamable materials reach a pressing unit, e.g.., a calibration belt running on the upper side thereof. In this way, the prepared sandwich-linings can be adjusted so as to have a desired thickness, while the sticking between the intermediate layers and both of the cover layers can be improved due to the action of the used pressure.

Hereinafter, the present invention will be described in detail based on an embodiment with reference to the attached schematic view. The single figure shows an apparatus for producing a both-side lined intermediate layer according to the present invention.

A cover layer 1, e.g., a steel sheet, is placed on an endless conveyor belt 1B. The conveyor belt 1B is guided by two rolls 6. The cover layer 1 is moved by the conveyor belt 1B of the apparatus.

As shown in the drawing, a mixing head 1A exists above the conveyor belt 1B on the left-side end in the starting-region of the conveyor belt. With the mixing head 1A, a

layer 1C of a foamable material with a uniform thickness is coated onto the cover layer 1.

Then, the cover layer 1 provided with the layer 1C is moved by the conveyor belt 1B into a placement-device 2A. In the device 2A, the intermediate layer 2 is placed on the layer 1C of a foamable material on the cover layer 1.

While both of these steps of the method proceed, in the second coating device having a mixing head 3A, if necessary, a layer 1C of a foamable material with a uniform thickness is coated onto a second cover layer 3 which may consist of a steel sheet, if necessary.

After the placement device 2a is left, the intermediate product comprising the cover layer 1, the layer 1c and the intermediate layer 2 is formed. In a second placement-device 4, the second cover layer 3 having the layer 1c is placed on the intermediate layer 2. Thus, this layer 1c of a foamable material exists between the intermediate layer and the upper, second cover layer 3.

The sandwich-element is guided by the second placement-device 4 to be under a calibration belt 5. The calibration belt 5 which is arranged at a predetermined distance from the upper stretched portion of the conveyor belt 1B and rides on the upper side of the upper cover layer 3.

The starting time of the reaction of the foamable materials 1c is so determined by selection of suitable

materials that this reaction is applied after the foamable materials reach the calibration-belt 5 riding on the upper side. As suggested schematically in the drawing, the calibration belt 5 as an endless belt is guided by two rolls 7 (the second roll is not shown), whereby the distance between the lower stretched portionof the calibration belt 5 and the upper side of the cover layer 3 can be varied by vertically shifting the calibration belt or the rolls 7.

According to a predetermined running time depending on the reaction-time of the foamable material 1C, a sandwich-element 16 which is schematically shown under the apparatus and consists of the foamed and both-side-lined intermediate layer can eliminate the space between the calibration belt 5 and the conveyor belt 1B.

The intermediate layers 2 may be made of paper, plastics, asbestos, wood, or other materials. In this case, the respective suitable material is selected depending on the characteristics and the use-object of the produced sandwich-element. The intermediate layer 2 should have a form suitable for the foaming. For example, wave-forms like corrugated boards or polygonal forms should be mentioned.

For example, suitable foamable materials include polyurethane-, polyisocyanurate- (PIR), water-glass-, phenol-, polyester- foam materials, and so forth.